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| 10/080,507      | 02/22/2002  | Jae Chang Jung       | 00939B-068710US     | 1185             |

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EXAMINER

LEE, SIN J

ART UNIT PAPER NUMBER

1752

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/080,507

Applicant(s)

JUNG ET AL.

Examiner

Sin J. Lee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4 is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/465,111.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. In view of the amendment, previous 102(e) rejections on claims 5-10 over Lee et al (6,403,281) and previous double patenting rejections on claims 5 and 7-10 over U.S. Pat.'281 are hereby withdrawn; the amended claim 5 now requires that **each** of the alicyclic monomers that are present in the copolymer to have the formula shown in claim 5 in which all of R<sub>1</sub>-R<sub>4</sub> do not represent H at the same time. Since Lee's polymer does include the monomer unit of norbornene or tetracyclododecene, Lee does not teach or suggest present inventions of claims 5-10.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3 and 11-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (6,403,281 B1).

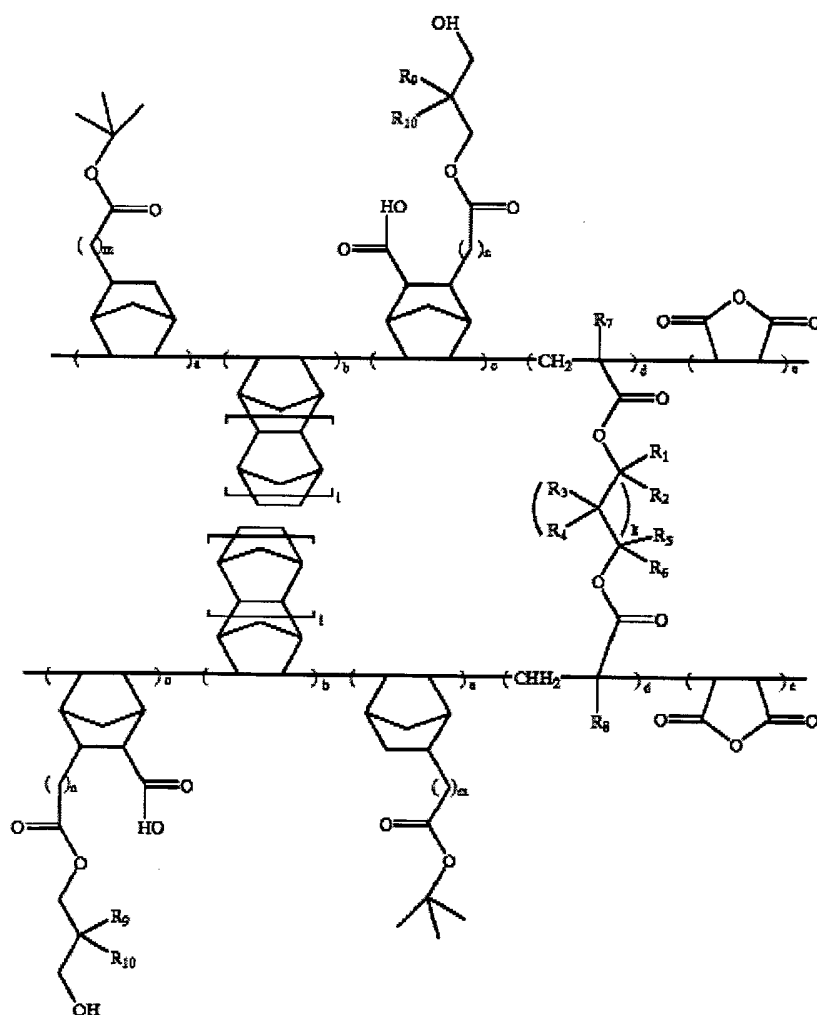
The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

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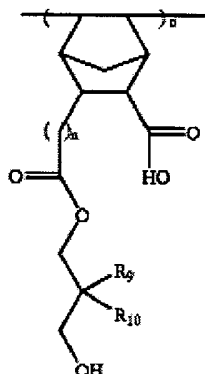
the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Lee teaches (col.6, lines 18-67, col.7, lines 48-53) the following polymer of the formula 10 as one of the two preferred photoresist polymers of his invention:

10



As shown above, Lee's polymer contains *two* of the following repeating unit;



in which  $n$  is an integer from 0-2, and  $R_9$  and  $R_{10}$  are H, or linear or branched  $C_1$ - $C_5$  alkyl. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit shown above in which  $n$  is 0, and both of  $R_9$  and  $R_{10}$  are H (because there are only several choices given for the variables  $n$ ,  $R_9$  and  $R_{10}$ ). The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1: present  $k$  would be 1;  $p$  would be 0;  $R_5$  would be H;  $R_2$  and  $R_3$  would be H atoms;  $R_4$  would be a straight  $C_1$  carboxylic acid; and  $R_1$  would be a straight  $C_4$  ester including one hydroxyl group. Therefore, Lee teaches present component (a) two alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1.

Lee teaches that  $R_1$ - $R_6$  in the repeating unit "d" in his polymer (as shown above) can independently be H, or linear or branched  $C_1$ - $C_5$  alkyl group. Therefore, one of ordinary skill in the art would immediately envisage all of  $R_1$ - $R_6$  to be H atoms (because there are only several choices given for the variables  $R_1$ - $R_6$ ). The monomer which forms such repeating unit teaches present crosslinking monomer of the formula shown in present claim 1: present  $m$  would be an integer of 1, and present  $R$  would be a straight  $C_3$  alkyl group. Therefore, Lee teaches present component (b) of claim 1.

Therefore, Lee teaches present invention of claim 1 (*although Lee's polymer shown above does include the monomer unit of norbornene or tetracyclododecene, the present claim language of claim 1 does not exclude the presence of such monomer units (unlike present claim 5, which requires **each** of the alicyclic monomers that are present in the polymer to be of the formula in which all of  $R_1$ - $R_4$  do not represent H at the same time)*).

Since Lee's polymer shown above includes the maleic anhydride repeating unit, Lee teaches present invention of claim 2.

With respect to present claim 3, Lee teaches that in his photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit "c" to be present in 1 mol% (because 1 mol % is included as the lower end of the taught range), the repeating unit "e" to be present 10 mol% (because 10 mol% is included as the lower end of the taught range), and the repeating unit "d" to be present in 0.1 mol% (because 0.1 mol% is included as the lower end of the taught range). Since these numbers fall within the present ranges of claim 3, Lee teaches present invention of claim 3.

With respect to present claims 11-13, Lee teaches (col.9, lines 51-65) a photoresist composition comprising his photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given by Lee in col.9, lines 54-65 are the same as those listed in present claim 13. Therefore, Lee teaches present inventions of claims 11-13.

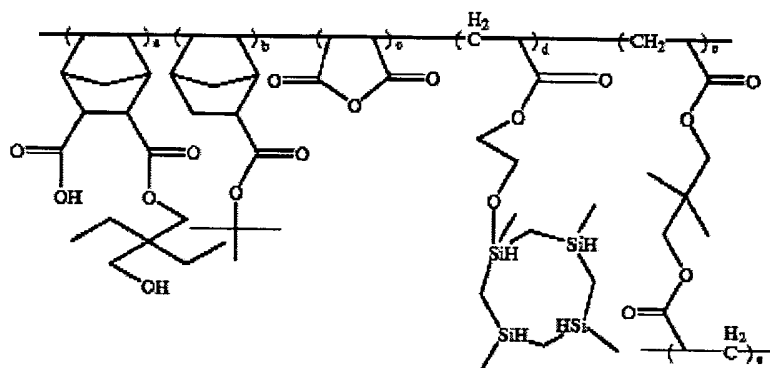
With respect to present claims 14-18, Lee teaches (col.10, lines 28-48) a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film using an aqueous solution of TMAH. Lee furthermore teaches that preferably, a baking step before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Lee teaches present inventions of claims 14-18.

Lee also teaches (col.10, lines 48-51) a semiconductor device which is manufactured using his photoresist composition. Therefore, Lee also teaches present invention of claim 19.

4. Claims 1-3 and 5-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (6,589,707 B2)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Lee teaches (see col.7-8) a polymer having the following formula:



Furthermore, Lee teaches (see col.8, lines 3-4) that preferably, the ratio of a:b:c:d:e is 0-20 mol%:0-50 mol%:0-50 mol%:0.1-30 mol%:0-10 mol%. Based on this teaching, one of ordinary skill in the art would immediately envisage the polymer shown above with  $b = 0 \text{ mol\%}$ . Such polymer teaches present polymer of claim 1 (preset  $R_4$  would represent  $C_8$  ester including one hydroxyl group and present R would be a branched  $C_5$  alkyl). Therefore, Lee teaches present inventions of claims 1 and 2.

With respect to present claim 3, Lee teaches that in the polymer shown above, the repeating unit a can be present in 0-20 mol%, the repeating unit c can be present in 0-50 mol%, and the repeating unit e can be present in 0-10 mol%. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit a to be present in the amount of 20 mol%, the repeating unit c to be present in the amount of 50 mol%, and the repeating unit e to be present in the amount of 10 mol%. Since these numbers fall within the present ranges of claim 3, Lee teaches present invention of claim 3.

With respect to present claims 11-13, Lee teaches (col.9, lines 33-51) a photoresist composition comprising his polymer, a photoacid generator, and an organic



solvent, and the examples listed for the photoacid generator in col.9, lines 41-51 are the same as those listed in present claim 13. Therefore, Lee teaches present inventions of claims 11-13.

With respect to present claims 14-19, Lee teaches (col.10, lines 3-13, lines 49-51) a process for forming a photoresist pattern which includes the steps of: (a) coating his photoresist composition on a substrate of a *semiconductor element* to form a photoresist film; (b) exposing the photoresist film to a light source (such as ArF exposer, KrF exposer, VUV exposer, EUV exposer, E-beam or X-ray); and (c) developing (using for example, 2.38 wt% aqueous TMAH solution – see Example 7) the photoresist film to produce the photoresist pattern. Lee furthermore teaches (col.10, lines 24-26) that the photoresist pattern formation process can further include the steps of heating the substrate before and/or after the step (b) described above, and in his Examples (see Example 7), he uses the temperature of 130°C for those heating steps. Therefore, Lee teaches present inventions of claims 14-19.

With respect to present claims 5-10, Lee teaches (see col.8, lines 64-67, col.9, lines 1-12) that polymer shown above (with  $b = 0$  mol%) is made by admixing the monomers that form the repeating units a, c, and d and a crosslinking monomer that forms the repeating unit e together with a polymerization initiator (such as AIBN, benzoyl peroxide, acetyl peroxide, lauryl peroxide, tert-butyl peroxide and bisazide compounds – see col.9, lines 26-29) and then polymerizing such admixture under conditions sufficient to produce the polymer shown above (with  $b = 0$  mol%), preferably in an inert atmosphere of nitrogen, argon or helium. Lee furthermore teaches (col.9,

lines 30-33) that the polymerization reaction is typically performed at a temperature range of 50-120°C. Based on this teaching, one of ordinary skill in the art would immediately envisage the temperature of 120°C as the polymerization reaction temperature. Therefore, Lee teaches present inventions of claims 5-8 and 10. Lee also teaches (col.9, lines 13-20) that his polymerization process can be a solution polymerization using any inert solvent such as tetrahydrofuran, dimethylformamide, ethylmethylketone, benzene, toluene and dioxane. Therefore, Lee teaches present invention of claim 9.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

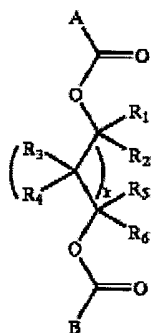
6. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (6,403,281 B1).

As explained in Paragraph 3 above, Lee's polymer includes present two alicyclic olefin derivative units of the Chemical Formula 4 of claim 20 and present two alicyclic monomer units of the formula shown in claim 21 (*although Lee's polymer shown above does include the monomer unit of norbornene or tetracyclododecene, the present claim language of claims 20 and 21 does not exclude the presence of such monomer units (unlike present claim 5, which requires **each** of the alicyclic monomers that are present*

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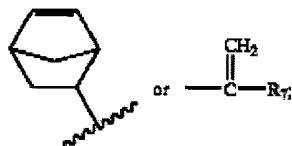
in the polymer to be of the formula in which all of  $R_1$ - $R_4$  do not represent H at the same time)).

As to the present cross-linking monomer comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate, Lee teaches a crosslinker monomer of the following formula

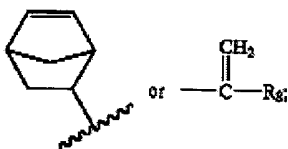


where

A is a moiety of the formula



B is a moiety of the formula



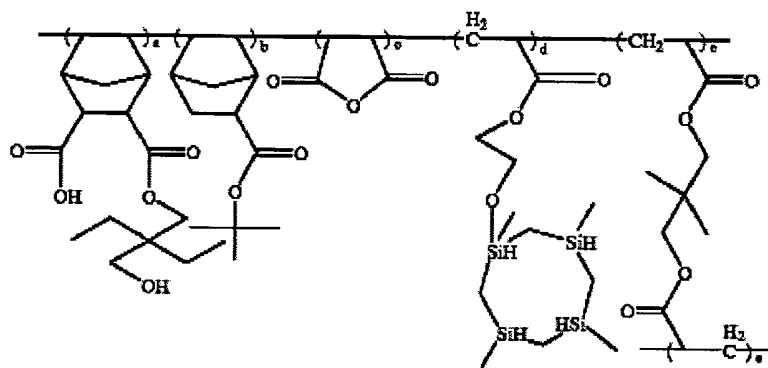
Lee furthermore teaches that  $R_7$  and  $R_8$  are preferably H or  $\text{CH}_3$ ;  $R_1$ - $R_6$  independently represents H, or linear or branched  $\text{C}_1$ - $\text{C}_5$  alkyl group, and that  $k$  is an integer from 0 to 3. Based on Lee's teaching, it would have been obvious to choose Lee's crosslinker monomer of the formula shown above in which A and B both are moiety of the formula  $-\text{C}(=\text{CH}_2)-\text{H}$ ,  $k$  is 2, and  $R_1$ - $R_6$  are all H atoms (in which case, the monomer would be the

*presently claimed 1,4-butanediol diacrylate*) with a reasonable expectation of obtaining photoresist composition having improved pattern profile, enhanced adhesiveness, excellent resolution, sensitivity, durability and reproducibility. Therefore, Lee's teaching would render obvious present inventions of claims 20 and 21.

7. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being obvious over Lee et al (6,589,707 B2).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

As discussed above in Paragraph 4, Lee teaches the following polymer with b= 0 mol%:



The last repeat unit e shown above is made from the monomer of neopentylglycol diacrylate (which meets the generic formula 7 shown in col.4, lines 27-58 for the crosslinking monomer) and Lee teaches the equivalence of neopentylglycol diacrylate and 1,4-butanediol diacrylate (since Lee teaches that R<sub>10</sub>-R<sub>13</sub> can all be H's and Y can be C<sub>2</sub> alkylene). Therefore, it would have been obvious to one of ordinary skill in the art to replace the monomer of neopentylglycol diacrylate with the monomer of 1,4-butanediol diacrylate in order to make the polymer shown above (with b=0 mol%) because the prior art teaches the equivalence of neopentylglycol diacrylate and 1,4-butanediol diacrylate. Therefore, Lee's teaching would render obvious present inventions of claims 20 and 21.

### ***Double Patenting***

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA

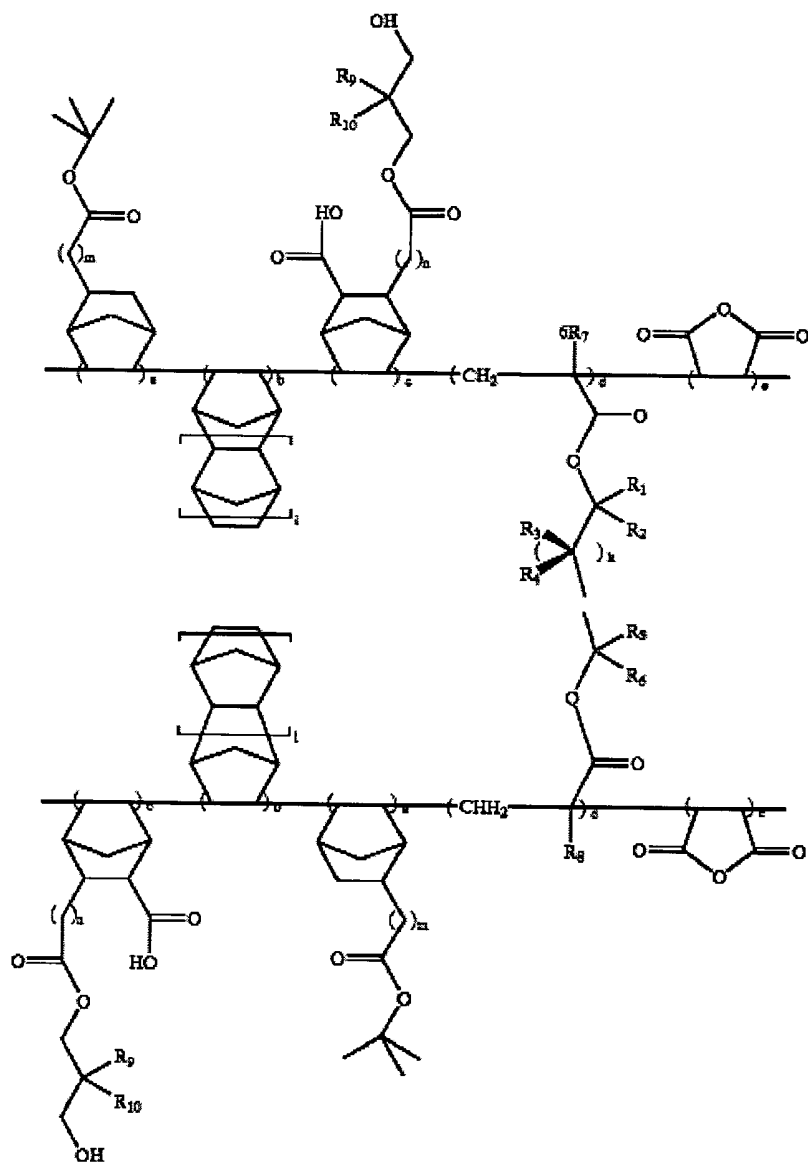
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1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

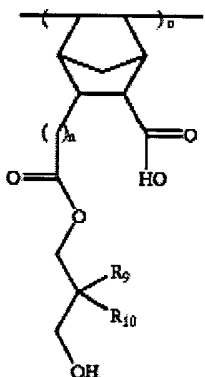
A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-3, 11-17, and 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4-8, 10, 12, 16-19, and 21 of U.S. Patent No. 6,403,281 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons: Claim 4 of Pat.'281 teaches the following photoresist copolymer;



The polymer shown above contains *two* of the following repeating unit;



in which  $n$  is an integer from 0-2, and  $R_9$  and  $R_{10}$  are H, or linear or branched  $C_1$ - $C_5$  alkyl. Based on this teaching, it would have been obvious to one of ordinary skill in the art to obtain the repeating unit shown above in which  $n$  is 0, and both of  $R_9$  and  $R_{10}$  are H (because there are only several choices given for the variables  $n$ ,  $R_9$  and  $R_{10}$ ) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281. The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1: present  $k$  would be 1;  $p$  would be 0;  $R_5$  would be H;  $R_2$  and  $R_3$  would be H atoms;  $R_4$  would be a straight  $C_1$  carboxylic acid; and  $R_1$  would be a straight  $C_4$  ester including one hydroxyl group. Therefore, claim 4 of Pat.'281 renders obvious the present component (a) two alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1. Claim 4 of Pat.'281 also teaches that  $R_1$ - $R_6$  in the repeating unit "d" in the polymer (as shown above) can independently be H, or linear or branched  $C_1$ - $C_5$  alkyl group. Therefore, it would have been obvious to one of ordinary skill in the art to choose all of  $R_1$ - $R_6$  to be H atoms (because there are only several choices given for the variables  $R_1$ - $R_6$ ) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281. The monomer which forms such repeating unit teaches present



crosslinking monomer of the formula shown in present claim 1: present m would be an integer of 1, and present R would be a straight C<sub>3</sub> alkyl group. Therefore, claim 4 of Pat.'281 renders obvious present component (b) of claim 1. Therefore, Pat.'281 renders obvious present inventions of claim 1 (*although Lee's polymer shown above does include the monomer unit of norbornene or tetracyclododecene, the present claim language of claim 1 does not exclude the presence of such monomer units (unlike present claim 5, which requires **each** of the alicyclic monomers that are present in the polymer to be of the formula in which all of R<sub>1</sub>-R<sub>4</sub> do not represent H at the same time)*)).

Since the polymer shown above includes the maleic anhydride repeating unit, claim 4 of Pat.'281 also teaches present invention of claim 2.

With respect to present claim 3, claim 4 of Pat.'281 teaches that in the photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Since these numbers overlap with the present ranges of claim 3, claim 4 of Pat.'281 would render obvious present invention of claim 3. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

With respect to present claims 11-13, claims 10 and 12 of Pat.'281 teach a photoresist composition comprising the photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given in claim 12 of

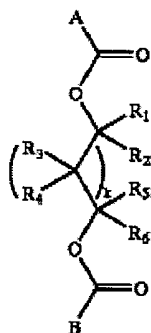
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Pat.'281 are the same as those listed in present claim 13. Therefore, Pat.'281 renders obvious present inventions of claims 11-13.

With respect to present claims 14-17, claims 16 and 19 of Pat.'281 teach a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film. Claims 17 and 18 of Pat.'281 furthermore teaches that a baking step before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Pat.'281 renders obvious present inventions of claims 14-17.

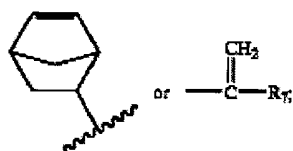
Claim 21 of Pat.'281 teaches a semiconductor device which is manufactured using his photoresist composition. Therefore, Pat.'281 also renders obvious present invention of claim 19.

With respect to present claims 20 and 21, as described above, Pat.'281 teaches present alicyclic olefin derivatives of the Chemical Formula 4 of claim 20 and the alicyclic monomer of the formula shown in claim 21. As to the present cross-linking monomer comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate, claim 1 of Pat.'281 teaches a crosslinker monomer of the following formula

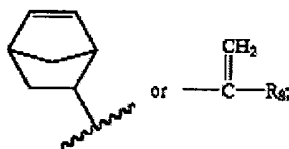


where

A is a moiety of the formula



**B** is a moiety of the formula

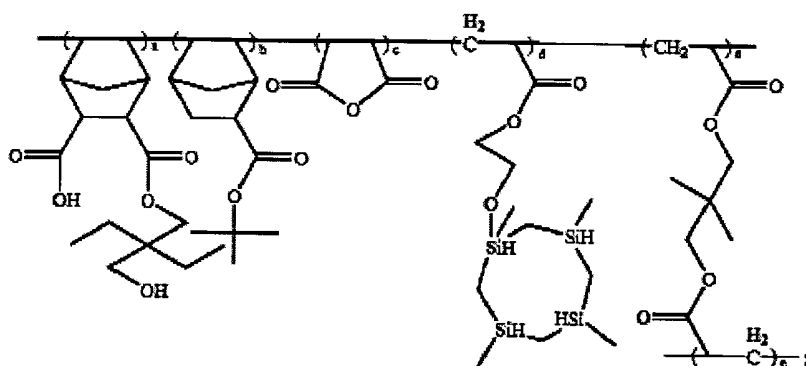


Claim 1 of Pat.'281 furthermore teaches that R<sub>7</sub> and R<sub>8</sub> can be H or linear or branched C<sub>1</sub>-C<sub>5</sub> alkyl group; R<sub>1</sub>-R<sub>6</sub> independently represent H, or linear or branched C<sub>1</sub>-C<sub>5</sub> alkyl group, and that k is an integer from 0 to 3. Based on this teaching, it would have been obvious to choose the crosslinker monomer of the formula shown above in which A and B both are moiety of the formula -C(=CH<sub>2</sub>)-H, k is 2, and R<sub>1</sub>-R<sub>6</sub> are all H atoms (*in which case, the monomer would be the presently claimed 1,4-butanediol diacrylate*) with a reasonable expectation of obtaining the photoresist polymer of claim 1 of Pat.'281. Therefore, the teaching of Pat.'281 would render obvious present inventions of claims 20 and 21.

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10. Claims 1-3, 11-13, and 20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11, 16, and 18-20 of U.S. Patent No. 6,589,707 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 18 of Pat.'707 teaches the following polymer:

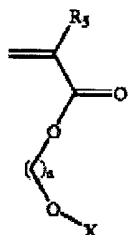


Since claim 16 of Pat.'707 teaches that the ratio of a:b:c:d:e:f is 0-20 mol%:0-50 mol%:0-50 mol%:0.1-30 mol%:0-10 mol%:0-50 mol%, it would have been obvious to one of ordinary skill in the art to obtain the polymer shown above with b = 0 mol% with a reasonable expectation of achieving a photoresist polymer. Such polymer teaches present polymer of claim 1 (preset R<sub>4</sub> would represent C<sub>8</sub> ester including one hydroxyl group and present R would be a branched C<sub>5</sub> alkyl). Therefore, claims 16 and 18 of Pat.'707 would render obvious present inventions of claims 1-3 (since present claim 3 does not require that present a + b + c = 100 mol%, the polymer shown above (with b = 0 mol%) still teaches present polymer of claim 3 having <Chemical Formula 5>).

Claim 19 of Pat.'707 states the following:

19. A photoresist composition comprising:

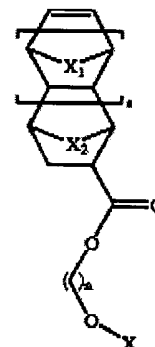
(i) photoresist polymer derived from a monomer comprising a first monomer selected from the group consisting of compounds of the formula:



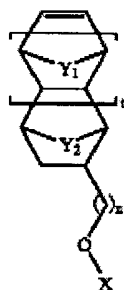
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-continued



-continued



and mixtures thereof, wherein

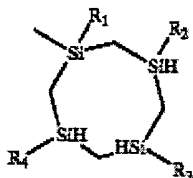
$X_1$ ,  $X_2$ ,  $Y_1$  and  $Y_2$  are alkylene;

$R_5$  is hydrogen or alkyl;

$s$  and  $t$  are integers from 0 to 2;

$n$  is an integer from 1 to 5; and

$X$  is a moiety of the formula:



wherein

each of  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  is independently hydrogen,  $C_1$ - $C_{10}$  alkyl, or  $C_1$ - $C_{10}$  alkyl comprising an ether linkage;

(ii) a photoacid generator; and

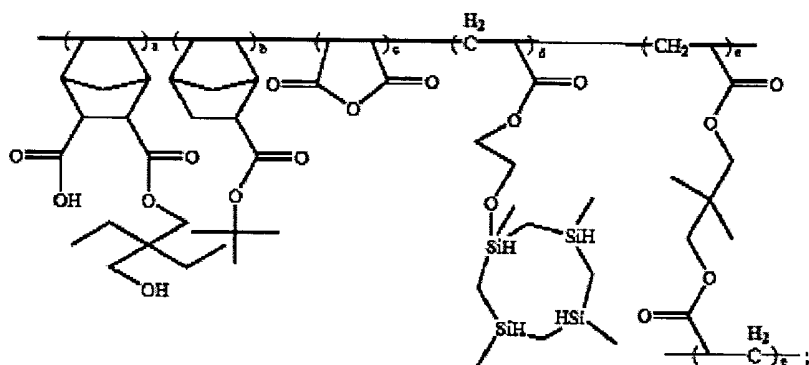
(iii) an organic solvent.

Since the polymer of claim 18 of Pat.707 meets the limitation for the polymer (i) of claim 19, it would have been obvious to one of ordinary skill in the art to use the polymer of

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claim 18 (with  $b = 0$  mol%) as the polymer (i) of claim 19 with a reasonable expectation of obtaining a photoresist composition. Also, those photoacid generators listed in claim 20 of Pat.'707 are the same as those listed in present claim 13. Therefore, claims 18-20 of Pat.'707 would render obvious present inventions of claims 11-13.

As discussed above, claims 16 and 18 of Pat.'707 renders obvious the following polymer



wherein  $b = 0$  mol%. Claim 11 teaches the equivalence of the neopentylglycol diacrylate (which makes up the last repeating unit of the polymer shown above) with 1,4-butanediol diacrylate (since claim 11 of Pat.'707 teaches that  $R_{10}$ - $R_{13}$  can all be H's and Y can be  $C_2$  alkylene). Therefore, it would have been obvious to one of ordinary skill in the art to replace the repeat unit of neopentylglycol diacrylate with the repeat unit of 1,4-butanediol diacrylate because claim 11 of Pat.'707 teaches the equivalence of neopentylglycol diacrylate and 1,4-butanediol diacrylate. Therefore, claims 16, 18, and 11 of Pat.'707 would render obvious present invention of claim 20.

### ***Allowable Subject Matter***

11. Claim 4 is allowed. None of the cited prior arts teaches or suggests those specific polymers claimed in present claim 4.

***Response to Arguments***

12. Applicants argue that since Lee's polymer (of Lee et al'281) includes the monomer unit of norbornene or tetracyclododecene, Lee's polymer does not teach present polymer. However, present claim language of claims 1, 20, and 21 does not exclude the presence of such monomer units because unlike present claim 5, present claims 1, 20, and 21 do not require **each** of the alicyclic monomers that are present in the copolymer to be of the present formula in which all of R<sub>1</sub>-R<sub>4</sub> do not represent H at the same time). Therefore, for this reason, present rejections on claims 1-3 and 11-21 over Lee et al'281 and present double patenting rejections on claims 1-3, 11-17, and 19-21 over Pat.'281 still remain.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

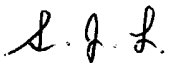
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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

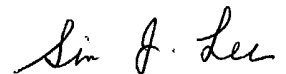
you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee

September 2, 2004



Sin J. Lee

Patent Examiner

Technology Center  
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